AMENDMENTS TO THE CLAIMS

Please amend the claims as set forth below in marked up form.

1. (Currently Amended) A liquid discharge apparatus having a head with a plurality of liquid dischargers ~~aligned in a row, each liquid discharger including a nozzle~~ and nozzles with a respective one of the plurality of nozzles operably associated a respective one of the liquid dischargers, the plurality of liquid dischargers and nozzles being aligned in a row, each one of the plurality of liquid dischargers defining an ink chamber, the liquid discharge apparatus, comprising:

a main controlling unit formed on each liquid discharger, the main controlling unit controlling the discharge of droplets from the ~~respective nozzle~~ nozzles;

a secondary controlling unit formed on each liquid discharger, the secondary controlling unit controlling the discharge of a droplet so that the droplet is discharged along at least one secondary direction different from a main direction of the droplets discharged by said each liquid discharger controlled by the main controlling unit; ~~and~~

a secondary-control executing unit for individually setting whether or not the secondary controlling unit for each liquid discharger is operated; and

a plurality of heat-generating resistor assemblies, each heat-generating resistor assembly including a pair of heat-generating resistors, a respective one of the plurality of heat-generating resistor assemblies being disposed in a respective chamber,

wherein the main controlling unit is operative to individually control an amount of heat of the heat-generating resistors of each one of the plurality of heat-generating resistor assemblies, the amount of heat generated in one heat-generating resistor of at least one pair of the heat-generating resistors being different than a remaining one of the at least one pair of the heat-generating resistors.

2. (Currently Amended) A liquid discharge apparatus having a head with a plurality of liquid dischargers ~~aligned in a row, each liquid discharger including a nozzle~~ and nozzles with a respective one of the plurality of nozzles operably associated a respective one of the liquid dischargers, the plurality of liquid dischargers and nozzles being aligned in a row, each one of

the plurality of liquid dischargers defining an ink chamber, the liquid discharge apparatus, comprising:

a discharge-direction changing unit for changing a direction of a droplet discharged from the nozzle of each liquid discharger in at least two different directions in the row; ~~and~~

a reference-direction setting unit for individually selecting for said each liquid discharger one of the directions of the droplet discharged from said each liquid discharger, controlled by the discharge-direction changing unit, as a reference direction; and

a plurality of heat-generating resistor assemblies, each heat-generating resistor assembly including a pair of heat-generating resistors, a respective one of the plurality of heat-generating resistor assemblies being disposed in a respective chamber,

wherein the discharge-direction changing unit is operative to change the direction of the droplet discharged from the nozzle by individually controlling an amount of heat of the heat-generating resistors of each one of the plurality of heat-generating resistor assemblies, the amount of heat generated in one heat-generating resistor of at least one pair of the heat-generating resistors being different than a remaining one of the at least one pair of the heat-generating resistors.

3. (Currently Amended) A liquid discharge apparatus having a head with a plurality of liquid dischargers ~~aligned in a row, each liquid discharger including a nozzle~~ and nozzles with a respective one of the plurality of nozzles operably associated a respective one of the liquid dischargers, the plurality of liquid dischargers and nozzles being aligned in a row, each one of the plurality of liquid dischargers defining an ink chamber, the liquid discharge apparatus, comprising:

a discharge-direction changing unit for changing a direction of a droplet discharged from the nozzle of each liquid discharger in at least two different directions in the row; ~~and~~

a discharge-angle setting unit for individually selecting for said each liquid discharger discharge angles for said droplet discharged from said each liquid discharger, controlled by the discharge-direction changing unit; and

a plurality of heat-generating resistor assemblies, each heat-generating resistor assembly including a pair of heat-generating resistors, a respective one of the plurality of heat-generating resistor assemblies being disposed in a respective chamber,

wherein the discharge-direction changing unit is operative to change the direction of the droplet discharged from the nozzle by individually controlling an amount of heat of the heat-generating resistors of each one of the plurality of heat-generating resistor assemblies, the amount of heat generated in one heat-generating resistor of at least one pair of the heat-generating resistors being different than a remaining one of the at least one pair of the heat-generating resistors.

4. (Currently Amended) A liquid discharge apparatus having a head with a plurality of liquid dischargers ~~aligned in a row, each liquid discharger including a nozzle~~ and nozzles with a respective one of the plurality of nozzles operably associated a respective one of the liquid dischargers, the plurality of liquid dischargers and nozzles being aligned in a row, each one of the plurality of liquid dischargers defining an ink chamber, the liquid discharge apparatus, comprising:

a discharge-direction changing unit for changing a direction of a droplet discharged from the nozzle of each liquid discharger in at least two different directions in the row;

a discharge-angle setting unit for individually setting for said each liquid discharger discharge angles for said droplet discharged from said each liquid discharger, controlled by the discharge-direction changing unit; and

a reference-direction setting unit for individually selecting for said each liquid discharger one of the directions of the droplet discharged from said each liquid discharger, controlled by the discharge-direction changing unit, as a reference direction; and

a plurality of heat-generating resistor assemblies, each heat-generating resistor assembly including a pair of heat-generating resistors, a respective one of the plurality of heat-generating resistor assemblies being disposed in a respective chamber,

wherein the discharge-direction changing unit is operative to change the direction of the droplet discharged from the nozzle by individually controlling an amount of heat of the heat-generating resistors of each one of the plurality of heat-generating resistor assemblies, the

amount of heat generated in one heat-generating resistor of at least one pair of the heat-generating resistors being different than a remaining one of the at least one pair of the heat-generating resistors.

5. (Previously Presented) A liquid discharger according to one of claims 2 to 4, further comprising:

a discharge controlling unit for controlling discharge of ink droplets by the discharge-direction changing unit so that a pixel row or a pixel is formed by discharging droplets from at least two neighboring liquid dischargers,

wherein droplets are discharged along different directions from at least two neighboring liquid dischargers to form a pixel row by landing on the same pixel row or to form a pixel by landing on a same pixel area.

6. (Previously Presented) A liquid discharger according to one of claims 2 to 4, further comprising:

a discharge controlling unit for controlling discharge of a droplet by the discharge-direction changing unit so that the droplet lands in a landing position in a pixel area, wherein the landing position is one of M (where M is an integer greater or equal to two) different landing positions aligned in a predetermined direction in the pixel area and at least a part of each of the M landing positions is included in the pixel area.

7. (Previously Presented) A liquid discharger according to one of claims 2 to 4, further comprising:

a first discharge controlling unit for controlling discharge of ink droplets by the discharge-direction changing unit so that a pixel row or a pixel is formed by discharging droplets from at least two neighboring liquid dischargers, wherein droplets are discharged along different directions from at least two neighboring liquid dischargers to form a pixel row by landing on the same pixel row or to form a pixel by landing on a same pixel area; and

a second discharge controlling unit for controlling the discharge of a droplet by the discharge-direction changing unit so that the droplet lands in a landing position in a pixel area,

wherein the landing position is one of M (where M is an integer greater or equal to two) different landing positions aligned in a predetermined direction in the pixel area and at least a part of each of the M landing positions is included in the pixel area.

8. (Previously Presented) A liquid discharger according to one of claims 2 to 4, further comprising:

a resolution increasing unit for increasing a number of pixels by controlling droplets discharged from each liquid discharger so that the droplets land in at least two different positions in a predetermined direction whereby the number of pixels is increased in comparison with the number of pixels formed by droplets discharged from each liquid discharger landing in one position.

9. (Previously Presented) A liquid discharger according to one of claims 2 to 4, further comprising:

a resolution increasing unit for increasing a number of pixels by controlling droplets discharged from each liquid discharger so that the droplets land in at least two different positions in a predetermined direction whereby the number of pixels increased in comparison with the number of pixels formed by droplets discharged from each liquid discharger landing in one position, and

a discharge controlling unit for controlling discharge of ink droplets by the discharge-direction changing unit so that a pixel row or a pixel is formed by discharging droplets from at least two neighboring liquid dischargers, wherein each droplet is discharged along different directions from at least two neighboring liquid dischargers to form a pixel row by landing on the same pixel row or to form a pixel by landing on a same pixel area.

10. (Previously Presented) A liquid discharger according to one of claims 2 to 4, further comprising:

a resolution increasing unit for increasing a number of pixels by controlling droplets discharged from each liquid discharger so that the droplets land in at least two different positions in a predetermined direction whereby the number of pixels increased in comparison with the

number of pixels formed by droplets discharged from each liquid discharger landing in one position; and

a discharge controlling unit for controlling discharge of a droplet by the discharge-direction changing unit so that the droplet lands in a landing position in a pixel area, wherein the landing position is one of M (where M is an integer greater or equal to two) different landing positions aligned in a predetermined direction in the pixel area and at least a part of each of the M landing positions is included in the pixel area.

11. (Previously Presented) A liquid discharger according to one of claims 2 to 4, further comprising:

a resolution increasing unit for increasing a number of pixels by controlling droplets discharged from each liquid discharger so that the droplets land in at least two different positions in a predetermined direction whereby the number of pixels increased in comparison with the number of pixels formed by droplets discharged from each liquid discharger landing in one position;

a first discharge controlling unit for controlling discharge of ink droplets by the discharge-direction changing unit so that a pixel row or a pixel is formed by discharging droplets from at least two neighboring liquid dischargers, wherein each droplet is discharged along different directions from at least two neighboring liquid dischargers to form a pixel row by landing on the same pixel row or to form a pixel by landing on a same pixel area; and

a second discharge controlling unit for controlling discharge of a droplet by the discharge-direction changing unit so that the droplet lands in a landing position in a pixel area, wherein the landing position is one of M (where M is an integer greater or equal to two) different landing positions aligned in a predetermined direction in the pixel area and at least a part of each of the M landing positions is included in the pixel area.

12. (Previously Presented) A liquid discharge apparatus according to claim 1 having a plurality of liquid dischargers comprising a liquid chamber containing liquid, bubble generation units disposed inside the liquid chamber for generating bubbles in the liquid contained in the liquid chamber by supplying energy, and a nozzle member provided with nozzles for discharging

the liquid contained in the liquid chamber in response to generation of bubbles by the bubble generation units,

wherein a secondary controlling unit controls the at least one secondary direction of a droplet discharged by supplying energy having a second value to the bubble generation units, the second value differs from a first value of the energy supplied to the bubble generation units by the main controlling unit, so that the at least one secondary direction of the droplet differs from the main direction of the droplet controlled by the main controlling unit.

13. (Previously Presented) A liquid discharge apparatus according to claim 1 having a plurality of liquid dischargers comprising a liquid chamber containing liquid, heating elements disposed in the liquid chamber for generating a bubble in the liquid contained in the liquid chamber by supplying energy, and a nozzle member provided with nozzles for discharging the liquid contained in the liquid chamber as a bubble is generated by the heating elements, wherein

a plurality of heating elements is aligned in parallel in a row in the liquid chamber and each heating element is serially connected, and

the secondary controlling unit includes a circuit with a switching element connected to the serial connection between the heating elements and controls the at least one secondary direction of a droplet by supplying an electrical current via the circuit to the connection between the heating elements or by receiving an electrical current from the connection to the heating elements to control the electrical current supplied to the heating elements, so that the secondary direction differs from the main direction controlled by the main controlling unit.

14. (Previously Presented) A liquid discharge apparatus according to one of claims 2 to 4 having a plurality of liquid dischargers comprising a liquid chamber containing liquid, bubble generation units disposed inside the liquid chamber for generating a bubble in the liquid contained in the liquid chamber by supplying energy, and a nozzle member provided with nozzles for discharging the liquid contained in the liquid chamber as a bubble is generated by the bubble generation units,

wherein the discharge-direction changing unit comprises a main controlling unit for controlling the discharge of droplets from nozzles by supplying energy to the bubble generation

units and a secondary controlling unit for controlling the direction of a droplet discharged by supplying energy having a second value to the bubble generation units, the second value differs from a first value of the energy supplied to the bubble generation units by the main controlling unit, so that the direction of the droplet differs from the direction of the droplet controlled by the main controlling unit.

15. (Previously Presented) A liquid discharge apparatus according to one of claims 2 to 4 having a plurality of liquid dischargers comprising a liquid chamber containing liquid, heating elements disposed inside the liquid chamber for generating a bubble in the liquid contained in the liquid chamber by supplying energy, and a nozzle member provided with nozzles for discharging the liquid contained in the liquid chamber as a bubble is generated by the heating elements, wherein

a plurality of heating elements is aligned in parallel in a row in the liquid chamber and each heating element is serially connected, and

the discharge-direction changing unit includes a circuit with a switching element connected to the serial connection between the heating elements and controls the direction of a droplet discharged from the nozzles by controlling the electrical current supplied to the heating elements by supplying an electrical current via the circuit to the connection between the heating elements or by receiving an electrical current from the connection between the heating elements, so that at least two different directions can be selected in a predetermined direction.

16. (Currently Amended) A method for discharging liquid from liquid dischargers, each liquid discharger having a nozzle and defining a chamber, the liquid dischargers formed on heads and aligned in a row, comprising the steps of:

providing a plurality of heat-generating resistor assemblies, each heat-generating resistor assembly including a pair of heat-generating resistors, a respective one of the plurality of heat-generating resistor assemblies being disposed in a respective chamber;

performing a main control of a discharge of droplets from the nozzle of each liquid discharger by individually controlling an amount of heat of the heat-generating resistors of each one of the plurality of heat-generating resistor assemblies, the amount of heat generated in one

heat-generating resistor of at least one pair of the heat-generating resistors being different than a remaining one of the at least one pair of the heat-generating resistors;

performing a secondary control of the discharge of droplets from each liquid discharger along at least one direction different from a main direction of the main control in a row; and

individually determining whether or not a secondary controlling unit is operated for each liquid discharger.

17. (Currently Amended) A method for discharging liquid from liquid dischargers, each liquid discharger having a nozzle and defining a chamber, the liquid dischargers formed on a plurality of heads and aligned in a row, comprising the steps of:

providing a plurality of heat-generating resistor assemblies, each heat-generating resistor assembly including a pair of heat-generating resistors, a respective one of the plurality of heat-generating resistor assemblies being disposed in a respective chamber;

selecting a direction of droplets discharged from the nozzle of each liquid discharger from at least two different directions in a predetermined direction;

individually selecting for said each liquid discharger one of the directions as a reference direction; and

discharging the droplets from the nozzle in the selected direction by individually controlling an amount of heat of the heat-generating resistors of each one of the plurality of heat-generating resistor assemblies, the amount of heat generated in one heat-generating resistor of at least one pair of the heat-generating resistors being different than a remaining one of the at least one pair of heat-generating resistors.

18. (Currently Amended) A method for discharging liquid from liquid dischargers, each liquid discharger having a nozzle and defining a chamber, the liquid dischargers formed on a plurality of heads and aligned in a row, comprising the steps of:

providing a plurality of heat-generating resistor assemblies, each heat-generating resistor assembly including a pair of heat-generating resistors, a respective one of the plurality of heat-generating resistor assemblies being disposed in a respective chamber;

selecting a direction of droplets discharged from the nozzle of each liquid discharger from at least two different directions in a predetermined direction; ~~and~~

setting a discharge angle of the droplets independently for said each liquid discharger; and

discharging the droplets from the nozzle in the selected direction and set discharge angle by individually controlling an amount of heat of the heat-generating resistors of each one of the plurality of heat-generating resistor assemblies, the amount of heat generated in one heat-generating resistor of at least one pair of the heat-generating resistors being different than a remaining one of the at least one pair of heat-generating resistors.

19. (Currently Amended) A method for discharging liquid from liquid dischargers, each liquid discharger having a nozzle and defining a chamber, the liquid dischargers formed on a plurality of heads and aligned in a row, comprising the steps of:

providing a plurality of heat-generating resistor assemblies, each heat-generating resistor assembly including a pair of heat-generating resistors, a respective one of the plurality of heat-generating resistor assemblies being disposed in a respective chamber;

selecting a direction of droplets discharged from the nozzle of each liquid discharger from at least two different directions in a predetermined direction;

individually selecting for said each liquid discharger one of the directions as a reference direction; ~~and~~

setting a discharge angle of the droplets independently for each liquid discharger; and

discharging the droplets from the nozzle in the selected direction as the reference direction and set discharge angle by individually controlling an amount of heat of the heat-generating resistors of each one of the plurality of heat-generating resistor assemblies, the amount of heat generated in one heat-generating resistor of at least one pair of the heat-generating resistors being different than a remaining one of the at least one pair of heat-generating resistors.

20. (Previously Presented) The liquid discharge apparatus according to one of claims 1 to 4, wherein said liquid dischargers are aligned in parallel in a row.

21. (Previously Presented) The method for discharging liquid from nozzles according to one of claims 16 to 19, wherein said liquid dischargers are aligned in parallel in a row.